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PRINCIPAL INVESTIGATOR: Nicole S. Bell, SC.D., MPH

CONTRACTING ORGANIZATION: Social Sectors Development Strategies, Inc
Boston, MA 02118-2025

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Nicole S. Bell, SC.D., MPH

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Social Sectors Development
Strategies, Inc
Boston, MA 02118-2025

E-Mail: nbell@ssds.net

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The main goal of this study is to improve our understanding of the relationship between alcohol problems and risk of serious injury by documenting the prevalence of alcohol-related diagnoses among soldiers admitted to the hospital with and without injuries. In this study's first year we have formulated diagnostic criteria for identifying alcohol- and injury-related hospitalizations and verified the continuity of diagnostic codes between the ICD-9 and the ICD-9-CM. Additionally, we have developed a method to identify unique alcohol-related hospitalizations using episodes of care in order to improve the accuracy of the frequency and prevalence estimates for alcohol-related diagnoses within the Army. Descriptive analyses of the prevalence of hospitalizations and characteristics of soldiers hospitalized for alcohol abuse have begun. Analyses comparing Army and civilian alcohol-related hospitalizations are also underway. The work to date highlights the importance of an expanded list of alcohol-related diagnostic criteria to ensure complete case ascertainment, and the necessity of constructing a valid episode of care methodology in order to obtain accurate estimates of alcohol-related hospitalizations.

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INTRODUCTION

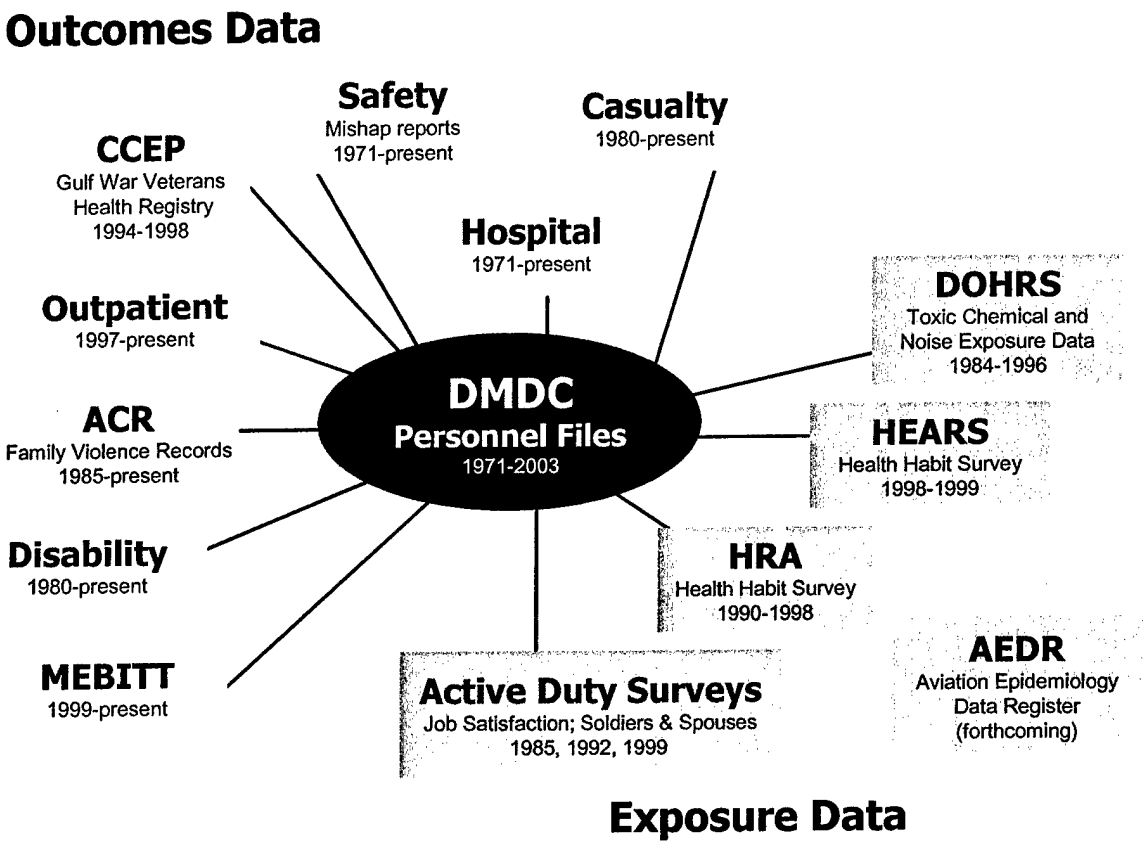
The main goal of this study is to improve our understanding of the relationship between alcohol problems and risk of serious injury. Specifically, this study will document the prevalence of alcohol-related diagnoses among soldiers admitted to the hospital with and without injuries, and ascertain the relationship between alcohol-related diagnoses and injury. We will also document patterns of injury (e.g., by major cause or mechanism) associated with different types of alcohol problems (e.g., acute intoxication, chronic abuse/dependence). Additionally, we will compare injured patients with and without alcohol comorbidities, in order to evaluate whether or not alcohol involvement increases the risk of recurrent injury hospitalization or subsequent injury death.

BACKGROUND

Injuries have a greater impact on the health and readiness of the U.S. armed forces than any other category of medical complaint. Acute injuries and musculoskeletal conditions (which are often the result of old injuries) account for more than 20% of outpatient visits (1), approximately 26% of hospitalizations (1), almost 60% of permanent disabilities (2), and almost 80% of active-duty deaths (3-5). The impact of injuries is felt in many ways, including lost productivity, decreased mission effectiveness, human suffering, and in the huge economic expenses associated with the care and rehabilitation of the injured (2, 6). Alcohol abuse and related problems are also an issue of great concern for the Army, and it has been estimated that the prevalence of alcohol problems is similar, if not greater, in the Army than for comparable age groups of the U.S. population (7). Alcohol abuse is an important potentially modifiable risk factor for injury, particularly off-duty injuries such as those sustained in motor vehicle crashes, falls, and assaults. For these reasons, the Department of Defense (DoD) has identified injuries and alcohol abuse as two of the top three targeted areas for health promotion and preventive care research (8). Despite these observations, many aspects of the quantitative relationship between alcohol abuse and injuries are not well understood. Improving our understanding of these associations is a necessary first step in the development of targeted interventions that can identify individuals at high risk of injury-related morbidity, mortality or repeat injury.

This research draws upon data from the Total Army Injury Health Outcomes Database (TAIHOD) (9, 10). Established at the U.S. Army Research Institute of Environmental Medicine (USARIEM) in 1994 to specifically examine the impact of injury and disability outcomes among U.S. Army soldiers, the TAIHOD now contains electronic records for all soldiers who have been on active duty since 1971 (nearly 5 million individuals). These data sources, which are linked at the level of the individual soldier, contain information on demographic and occupational characteristics, inpatient and outpatient health care utilization, and a variety of adverse health outcomes such as casualties, disabilities, accidents, and early separation from the Army (see Figure 1).

Figure 1. Components of the Total Army Injury Health Outcomes Database (TAIHOD)



FIRST YEAR PROGRESS

This section of the report outlines our research progress to date on each of our approved Statement of Work (SOW) objectives. Note that this grant was originally awarded to the Johns Hopkins University School of Hygiene and Public Health, where the original Principal Investigator, Dr. Gordon Smith, was employed. Upon Dr. Smith's departure from Johns Hopkins, the grant was transferred to Dr. Nicole Bell, of SSDS, Inc. However, due to administrative difficulties, funding was not officially transferred to SSDS until January 20, 2003. Therefore, although this annual report covers the time period from August 1, 2002, through July 31, 2002, it in fact addresses only the progress made by SSDS toward the approved SOW objectives between January 20, 2003, and July 31, 2003.

SOW TASK 1

Hire staff for project. Establish formal contract and budget arrangements. Establish access to all necessary databases; complete human subjects review and establish confidentiality safeguards for this project.

Progress

In January 2003, Dr. Katy Benjamin joined SSDS, Inc., as a Senior Scientist. Dr. Benjamin serves as project manager for this study, coordinating all analyses and overseeing the daily operations of the research. She is also responsible for several products associated with the study, including the descriptive epidemiology of alcohol hospitalizations and the paper describing the relationship of alcohol to injury and other comorbidities among hospitalized Army personnel.

We have sought and received approval from our IRB, the ARIEM Human Use Review Committee (HURC) for this project. The local approval from our HURC was forwarded to the Human Subjects Research Review Board (HSRRB), who completed their review of the protocol and approved the project in early January 2003. Both committees have approved the measures we have taken to safeguard human subject confidentiality. All team members and consultants have complied with training requirements pertaining to human subject confidentiality.

We have begun extracting information from the TAIHOD and constructing the analytic datasets that are needed to address our Year 1 SOW objectives. The data sources that will be instrumental in addressing our Year 1 Specific Aims (namely, personnel and hospitalization files) are up to date through 1999 and have been cleaned and examined for completeness. We have recently acquired Army hospitalization data through December 2002, and will file an amended study protocol with our IRB, the ARIEM HURC, seeking permission to extend the period of follow up for these analyses. We will also seek permission from our Grants Officer to amend our SOW accordingly.

We have obtained the public access data files from the National Hospital Discharge Survey (NHDS) and have begun exploring these files in order to perform comparative analyses between military and civilian alcohol-related hospitalizations.

SOW TASK 2

Identify cases with alcohol diagnoses in the hospital discharge data. Calculate incidence and prevalence rates of alcohol diagnoses as both principle and secondary diagnoses.

Progress: Establishing Diagnostic Criteria for Alcohol-Related Hospitalizations

A major focus of our work to date has been on the formulation of the diagnostic criteria to identify alcohol- and injury-related hospitalizations in the Army databases. Although the grant proposal contained a preliminary list of alcohol-related diagnoses, we began with a thorough review of the literature and consultation with our consultants to be sure that we had carefully enumerated the study population. For example, ingestion of nonbeverage alcohol such as mouthwash, aftershave lotion, and alcohol-based fuels is not uncommon among alcoholics (11, 12). However, diagnoses associated with the toxic effects of these substances are rarely included in studies of the prevalence of alcohol abuse in hospitalized patients. Similarly, discharge diagnoses of adverse effects of alcohol deterrents (ICD-9-CM codes 977.3 and E947.3) or history of mental disorders due to alcohol (V11.3) are infrequently used in alcohol epidemiology research. The diagnosis of fetal alcohol syndrome (760.71) was specifically excluded from the recent National Institute on Alcohol Abuse and Alcoholism (NIAAA) surveillance report because "childbirth is not an illness," and so all patients hospitalized for this purpose were eliminated from the denominator population (13). The omission of these codes from many civilian studies has potentially resulted in an underassessment of the morbidity burden associated with alcohol abuse. Based upon these considerations and further discussions with our consultants, we formulated a revised list of diagnostic criteria for identifying alcohol-related hospitalizations (see Table 1).

Table 1. Diagnostic codes for identification of alcohol-related hospitalizations

Category	Classification in ICD-9-CM
Alcoholic psychoses	291.0 Alcohol withdrawal delirium
	291.1 Alcohol amnestic syndrome
	291.2 Other alcoholic dementia
	291.3 Alcohol withdrawal hallucinosis
	291.4 Idiosyncratic alcohol intoxication
	291.5 Alcoholic jealousy
	291.8 Other specified alcoholic psychosis
	291.81 Alcohol withdrawal
	291.89 Alcohol psychosis—Other
	291.9 Unspecified alcoholic psychosis
Alcohol dependence syndrome	303.0 Acute alcoholic intoxication
	303.00 Acute alcoholic intoxication—Unspecified
	303.01 Acute alcoholic intoxication—Continuous
	303.02 Acute alcoholic intoxication—Episodic
	303.03 Acute alcoholic intoxication—In remission
	303.9 Other and unspecified alcohol dependence
	303.90 Other and unspecified alcohol dependence—Unspecified
	303.91 Other and unspecified alcohol dependence—Continuous
	303.92 Other and unspecified alcohol dependence—Episodic
	303.93 Other and unspecified alcohol dependence—In remission
	357.5 Alcoholic polyneuropathy
	425.5 Alcoholic cardiomyopathy
	535.3 Alcoholic gastritis
	535.30 Alcohol gastritis without mention of hemorrhage
	535.31 Alcohol gastritis with hemorrhage
Nondependent abuse of alcohol	305.00 Alcohol abuse—Unspecified
	305.01 Alcohol abuse—Continuous
	305.02 Alcohol abuse—Episodic
	305.03 Alcohol abuse—In remission
Chronic liver disease and cirrhosis	571.0 Alcoholic fatty liver
	571.1 Acute alcoholic hepatitis
	571.2 Alcoholic cirrhosis of liver
	571.3 Alcoholic liver damage, unspecified
	571.5 Cirrhosis of liver without mention of alcohol
	571.6 Biliary cirrhosis
	571.8 Other chronic nonalcoholic liver disease
	571.9 Unspecified chronic liver disease without mention of alcohol
Other conditions	760.71 Alcohol affecting fetus via placenta or breast milk
	790.3 Excessive blood level of alcohol
	977.3 Poisoning by alcohol deterrents
	980.0 Toxic effect of ethyl alcohol
	980.1 Toxic effect of methyl alcohol
	980.2 Toxic effect of isopropyl alcohol
	980.8 Toxic effect of other specified alcohols
	980.9 Toxic effect of unspecified alcohol
	V11.3 Personal history of alcoholism
	V79.1 Screening for alcoholism
	E947.3 Adverse effects of alcohol deterrents

The study period spans the years from 1980–1999. Beginning in approximately 1986 (the roll-out date was not uniform), many military medical facilities switched from using the ICD-9 to the ICD-9-CM when assigning diagnoses. In order to ensure that we were capturing all cases with alcohol involvement in the same way, we explored differences between the two versions of diagnostic codes. We compared all ICD-9-CM diagnoses included in the case criterion to those in the ICD-9 (Table 2). This analysis revealed that no substantive diagnostic coding differences existed to the level of two decimal places. We concluded that the shift from ICD-9 to ICD-9-CM would not affect our analyses.

Table 2. Comparison of codes for alcohol-related diagnoses in ICD-9-CM and ICD-9

Category	ICD-9-CM	Description	ICD-9	Description
Alcoholic psychoses	291.0	Alcohol withdrawal delirium	291.0	Delirium tremens
	291.1	Alcohol amnestic syndrome	291.1	Korsakoff's psychosis, alcoholic
	291.2	Other alcoholic dementia	291.2	Other alcoholic dementia
	291.3	Alcohol withdrawal hallucinosis	291.3	Other alcoholic hallucinosis
	291.4	Idiosyncratic alcohol intoxication	291.4	Pathological drunkenness
	291.5	Alcoholic jealousy	291.5	Alcoholic jealousy
	291.8	Other specified alcoholic psychosis	291.8	Other specified alcoholic psychosis
	291.81	Alcohol withdrawal	291.81	Alcohol withdrawal
	291.89	Alcohol psychosis—Other	291.89	Other specified alcohol psychosis
	291.9	Unspecified alcoholic psychosis	291.9	Unspecified alcoholic psychosis
Alcohol dependence syndrome	303.0	Acute alcoholic intoxication	303.0	Alcohol dependence with acute intoxication
	303.00	Acute alcoholic intoxication—Unspecified	303.00	Alcohol dependence, unspecified
	303.01	Acute alcoholic intoxication—Continuous	303.01	Alcohol dependence, Continuous
	303.02	Acute alcoholic intoxication—Episodic	303.02	Alcohol dependence, Episodic
	303.03	Acute alcoholic intoxication—In remission	303.03	Alcohol dependence, In remission
	303.9	Other and unspecified alcohol dependence	303.9	Alcohol dependence, unspecified
	303.90	Other and unspecified alcohol dependence—Unspecified	303.90	Unspecified dependence
	303.91	Other and unspecified alcohol dependence—Continuous	303.91	Unspecified dependence, Continuous
	303.92	Other and unspecified alcohol dependence—Episodic	303.92	Unspecified dependence, Episodic
	303.93	Other and unspecified alcohol dependence—In remission	303.93	Unspecified dependence, In remission
	357.5	Alcoholic polyneuropathy	357.5	Alcoholic polyneuropathy
	425.5	Alcoholic cardiomyopathy	425.5	Alcoholic cardiomyopathy
	535.3	Alcoholic gastritis	535.3	Alcoholic gastritis
	535.30	Alcohol gastritis without mention of hemorrhage	535.30	Alcohol gastritis without hemorrhage
	535.31	Alcohol gastritis with hemorrhage	535.31	Alcohol gastritis with hemorrhage
Nondependent use of alcohol	305.0	Alcohol Abuse—Unspecified	305.0	Alcohol Abuse—Unspecified
	305.00	Alcohol Abuse—Unspecified	305.00	Alcohol Abuse—Unspecified
	305.01	Alcohol Abuse—Continuous	305.01	Alcohol Abuse—Continuous
	305.02	Alcohol Abuse—Episodic	305.02	Alcohol Abuse—Episodic
	305.03	Alcohol Abuse—In remission	305.03	Alcohol Abuse—In remission
Chronic liver disease and cirrhosis	571.0	Alcoholic fatty liver	571.0	Alcoholic fatty liver
	571.1	Acute alcoholic hepatitis	571.1	Acute alcoholic hepatitis
	571.2	Alcoholic cirrhosis of liver	571.2	Alcoholic cirrhosis of liver
	571.3	Alcoholic liver damage, unspecified	571.3	Alcoholic liver damage, unspecified
	571.5	Cirrhosis of liver without mention of liver	571.5	Nonalcoholic cirrhosis of liver
	571.6	Biliary cirrhosis	571.6	Biliary cirrhosis
	571.8	Other chronic nonalcoholic liver disease	571.8	Other nonalcoholic chronic liver disease
	571.9	Unspecified chronic liver disease without mention of alcohol	571.9	Unspecified nonalcoholic chronic liver disease
Other conditions	760.71	Alcohol affecting fetus via placenta or breast milk	760.71	Fetal alcohol syndrome
	790.3	Elevated blood level of alcohol	790.3	Elevated blood alcohol level

Category	ICD-9-CM Description	ICD-9 Description
	977.3 Poisoning by alcohol deterrents	977.3 Poisoning by alcohol deterrents
	980.0 Toxic effect of ethyl alcohol	980.0 Toxic effect of ethyl alcohol
	980.1 Toxic effect of methyl alcohol	980.1 Toxic effect of methyl alcohol
	980.2 Toxic effect of isopropyl alcohol	980.2 Toxic effect of isopropyl alcohol
	980.8 Toxic effect of other specified alcohols	980.8 Toxic effect of other specified alcohols
	980.9 Toxic effect of unspecified alcohol	980.9 Toxic effect of unspecified alcohol
	V11.3 Personal history of alcoholism	V11.3 Personal history of alcoholism
	V79.1 Screening for alcoholism	V79.1 Screening for alcoholism
	E947.3 Adverse effects of alcohol deterrents	E947.3 Alcohol deterrents causing adverse effects in therapeutic use

Progress: Establishing Diagnostic Criteria for Injury-Related Hospitalizations

In conjunction with this work, we have developed the diagnostic criteria for identifying injury-related hospitalizations in Army databases, using ICD-9-CM diagnostic codes. Once again we began with a review of the literature and met with consultants to review and consider all options. Some conditions listed in the 800-999 ICD-9-CM injury category, such as complications from medical procedures, are not considered by most injury epidemiologists to be true "injuries" and not likely to be causally associated with alcohol abuse. We have excluded these conditions from our case definition. Moreover, several codes within the range of injury codes pertain to alcohol-related poisoning. We have excluded these from our injury case definition because they are included in the case definition criteria for alcohol-related hospitalizations. We are also evaluating the inclusion of several conditions that lay outside the traditional range of injury and poisoning codes (800-999). For example, the codes in ICD-9-CM between 710-739 are typically used to code chronic musculoskeletal conditions, but several of these codes may also apply to acute musculoskeletal injuries (e.g., internal derangement of the knee). Based upon our literature review and input from our consultants, we will examine these codes and decide which of them to include in our injury case definition. The list of all injury diagnoses to be used in this study will potentially include:

- All Injury and Poisoning diagnoses (800 – 999) EXCEPT:
  - ICD-9-CM 905–909, Late effects of injuries, poisonings, toxic effects, and other external causes. These were excluded on the grounds that they do not represent acute injuries that could be associated with current alcohol abuse.
  - ICD-9-CM 980.0–980.2; 980.8, 980.9, Toxic effects of alcohol (various)
  - ICD-9-CM 977.3, Poisoning by alcohol deterrents
- ICD-9-CM 310.2, Post-concussion syndrome
- Selected conditions from the ICD-9-CM Musculoskeletal System and Connective Tissue category (codes 710 – 739).

In addition to refining our injury case definition we have also spent time considering the ways in which cause of injury is to be coded for some or our analyses. Military hospitals do not use the ICD-9-CM system of E-codes for indicating external cause of injury. They instead use the North Atlantic Treaty Organization Standardization Agreement (STANAG) 2050 coding system (14, 15). The STANAG system was established by treaty among the NATO member nations to facilitate sharing information about battle casualties. It codes all injuries (whether combat related or not) according to intent, duty status, and specific cause. Coding compliance for injuries in military healthcare facilities is excellent, as the computer system automatically prompts for the selection of a STANAG code if the record contains an ICD-9-CM code for injury or poisoning (i.e., in the range 800-999) anywhere in the record. The STANAG codes comprise two elements, the Trauma code and the Injury code. The Trauma code identifies duty status at the time of the injury (see Table 3).

Table 3. STANAG Trauma codes

General Trauma Class	Code	Definition
Battle wound or injury	0	Direct result of action by or against an organized enemy
	1	Other battle casualties
Intentionally inflicted nonbattle injuries	2	Result of intervention of legal authority
	3	Assault, or intentionally inflicted by another person
	4	Intentionally self-inflicted
Accidental injury	5	Occurring while off-duty (includes leave, pass, AWOL, and other off-duty)
	6	Schemes and exercises
	7	All other scheduled training (including basic training), assault courses, etc.
	8	Occurring while on duty
	9	Unknown whether on or off duty

The STANAG codes describing specific external causes of injury appear in Table 4.

Table 4. STANAG Injury codes

Category	Major Group	Minor Group	Category Description
I	000-059		Accidents in air transport, as specifically defined, spacecraft accidents and escape system injuries
		000-029	Air transport involving military aircraft
		030-039	Air transport involving nonmilitary and unspecified aircraft
		040-049	Accidents involving spacecraft
		051-057	Escape system injuries
II	100-149		Accidents in land transport, as specifically defined
		100-109	Private vehicle
		110-119	Military vehicle
		120-129	Nontraffic private
		130-139	Nontraffic military
		140-149	Rail and other land transport
III	150-199		Accidents in water transport, as specifically defined
IV	200-249		Athletics and sports, including physical training
V	250-299		Reactions, complications, and misadventures in medical or surgical procedures and late effects
VI	300-479		Instrumentalities of war, when employed by the enemy in wartime
		300-319	Agents of nuclear warfare
		320-339	Agents of chemical warfare, excluding incendiaries
		340-359	Agents of biological warfare
		360-399	Other unconventional instrumentalities of war
		400-419	Conventional weapons injury to occupant of aircraft
		420-439	Conventional weapons injury to person on board ship
		440-459	Conventional weapons injury to person on and or in unspecified location
		460-479	Indirect or secondary effects of instrumentalities of war, when employed as such in wartime
VII	480-499		Accidents in connection with own instrumentalities of war, when employed as such in wartime
VII	50*-59*		Guns, explosives, and related agents, except when used as instrumentalities of war in wartime
IX	60*-69*		Machinery, tools, and selected agents
X	70*-79*		Poisons, fire, hot or corrosive substances
XI	80*-89*		Specified environmental factors
XII	90*-99*		Falls and miscellaneous other or unspecified agents

Note that Injury codes in Categories VII-XII also require place-of-occurrence codes ranging from 0 to 9 (see Table 5).

Table 5. STANAG Place of occurrence codes

Code	Place of Occurrence of Injury
0	On board aircraft or spacecraft or in the air, or in space
1	On board ship or other water transport, or in water (sea, rivers, lakes, etc).
2	On land and at an airfield
3	On land and at a dock
4	On land and at an industrial plant (e.g. ordnance factory, supply warehouse, repair shop)
5	On land and on a firing range or drill field
6	On land and on obstacle course
7	On land and in kitchen (other than home), mess hall, or bakery
8	On land and in the home, quarters or barracks.
9	On land other or unspecified

In addition to cause of injury codes, cases will also be grouped into similar categories of injury (e.g., traumatic, poisoning, environmental exposure). These injury groupings will be determined in later analytic planning meetings with input from consultants.

Progress: Identifying Unique Episodes of Care

Most population-based epidemiologic studies of the prevalence of alcohol-related hospitalizations rely on datasets without unique identifiers and are therefore unable to link records belonging to the same individual. Thus, individuals admitted to the hospital and then transferred to another care facility would likely be counted twice for the same episode of care. The problem of accurately counting hospitalizations without over-counting due to transfer cases has been well documented in the medical literature (16, 17) (18) although our recent review of the literature did not identify any publications that discussed it specifically with respect to hospitalizations for alcohol-related problems.

One advantage to hospitalization data contained in the TAIHOD is the presence of identifiers and the relative completeness of data on all hospitalizations, which allows us to identify unique hospitalization events as distinct from continuations of care for the same event. This represents an important advantage over many studies in that it gives us the ability to arrive at more accurate estimates of the incidence and prevalence of alcohol conditions among hospitalized soldiers. Identification of transfers in the TAIHOD hospital database is possible through the use of specific variables in the hospital database that indicate whether the hospitalization is a transfer into or out of the hospital from or /to another facility. Our investigation of these variables indicated that the transfer codes were not always complete. Thus we decided to not rely solely upon the transfer codes to determine whether or not consecutive hospitalizations represented a single episode of care or were two unique events. We developed a method that defined continuations of care (transfer cases) based upon the presence of transfer codes in both the initial hospitalization record and the following transfer record, **or** cases where there are no transfer codes present but where soldiers have consecutive, contiguous hospitalizations for alcohol-related conditions, and there are no more than 3

days between admissions. Given our findings, this should serve as a conservative measure of transfer cases. Using this method, we have identified 65,681 hospitalizations representing 53,730 individual patients. Approximately 8% of all hospitalizations over the entire study interval appear to be transfers for the same episode of care. Table 6 provides descriptive information on the frequency of alcohol-related hospitalizations for the entire study period.

Table 6. Frequency of alcohol-related hospitalizations among active duty Army soldiers, 1980-1999

	N
Individual Alcohol-related hospitalizations, 1980-1999	71,009
Transfer hospitalizations	5,328
Alcohol-related episodes of hospital care, 1980-1999	
Total	65,681
1980-1984	15,066
1985-1989	18,240
1990-1994	23,853
1995-1999	8,522

We have begun descriptive analyses of demographic characteristics in the case population (Table 7), as well as the incidence rates of alcohol-related hospitalizations over time, by diagnosis type and position (primary diagnosis and any other position in the discharge diagnosis), and in relationship to comorbid conditions also listed in the hospital record. These findings will be presented in our first manuscript.

Table 7. Demographic characteristics of active duty Army soldiers hospitalized for alcohol-related conditions, 1980–1999

Demographic characteristic	Frequency	Percent
Gender		
Male	60, 363	92%
Female	5,294	8%
Age		
< 21	10,083	15%
21 – 25	21,561	33%
26 – 30	12,731	19%
31 – 35	9,986	15%
36 – 40	7,658	12%
> 40	3,559	5%
Ethnicity		
White	45,695	70%
African-American	15,060	23%
Hispanic	2,261	3%
Indian/Alaskan	893	1%
Asian/Pacific Island	492	0.75%
Other	1,252	2%
Unknown	28	0.04%
Education		
< High school	3,738	6%
High School/GED	54,683	83%
Some college	4,117	6%
College	1,946	3%
> College	740	0.01%
Rank		
E1 – E4	38,008	58%
E5 – E9	25,446	39%
Warrant Officer	519	0.8%
O1 – O3	869	1%
O4 – O5	699	1%
O6 – O11	129	0.2%
Time in service		
< 2 years	18,619	28%
2 – 5 years	16,804	26%
> 5 years	19,224	29%

In addition, we propose producing an additional manuscript under this SOW objective that describes our methodology for constructing episodes of care, using examples from the alcohol- and injury-related diagnoses examined in this study.

Progress: Comparisons to National Hospital Discharge Survey Data

As stated in our specific aims, the first paper will compare incidence rates of alcohol-related hospitalizations in the military to those for the same time period within the general civilian population. Towards this end, we have procured data from the National Hospital Discharge Survey (NHDS) for the years 1979-1997. NHDS data for the years 1998-1999 are not presently available, and we will adjust the military data used for the comparative analyses to take this into account.

Using the same case diagnosis definition for alcohol-related hospitalizations that we are employing in our Army data, we plan to calculate annual rates of alcohol-related hospitalizations for the civilian population, adjusting for differences in age, gender, and

race between military and nonmilitary populations. It should be noted that the NHDS data cannot be linked at the patient level and thus cannot be used to construct episodes of care, as we intend to do with the military data. Thus, we expect some discrepancies between military and civilian rates of alcohol-related hospitalizations, because we will not be able to parse the civilian data for unique episodes of care. We will discuss this in the limitations section of the paper.

SOW TASK 3

Develop linkage between cases in hospitalization databases; obtain, analyze, and link data from mortality databases with hospitalization records.

Progress: Link Army Data Sources on Nonfatal and Fatal Injuries

All linkages necessary for the analysis of case characteristics and alcohol-related hospitalizations have been formulated, using data from the TAIHOD personnel and hospitalization databases. Some of the SOW objectives for later years of this study will employ Army data on fatalities. While the original proposal indicated that mortality data would be linked at the beginning of the study, we find it more efficient to link data closer to the time when the analyses will be performed. Thus, mortality data will be examined in subsequent years of this study, when the outcomes of alcohol-related hospitalizations are analyzed. We therefore defer this portion of the task until Year 03.

SOW TASK 4A

Begin preparation of paper on the prevalence of alcohol diagnoses in the army.

Progress: Calculating Incidence of Alcohol-Related Hospitalizations

As indicated in the discussion of SOW Task 2 progress, we are calculating rates of alcohol-related hospitalizations among active-duty Army personnel and have begun the construction of rates for various subgroups of interest (e.g., gender, age, rank, race) and by year. We will also calculate rates according to various categories of alcohol-related conditions, as displayed in Table 1. Prevalence is being calculated for hospitalizations with alcohol diagnoses in the primary position and other diagnostic positions. Where alcohol-related conditions are not the primary diagnosis at discharge, we are constructing rates by type of comorbidity, using the major ICD-9-CM diagnostic categories to describe these other conditions. Additionally, we are constructing the dataset of all alcohol-related hospital discharges to be used in the analyses comparing military and nonmilitary personnel.

OTHER PROGRESS

We were recently contacted by Dr. Les McFarling of the Army Center for Substance Abuse Programs (ACSAP). One of the many programs the ACSAP oversees is the Drug and Alcohol Management Information System (DAMIS), the current and historical repository of data submitted by Army Substance Abuse Programs (ASAP) worldwide along with U.S. Army and contract forensic and toxicology drug testing laboratories (FTDTLs). It provides information on ASAP screenings and/or enrollments, urinalysis testing, prevention and education efforts and ASAP resource and

performance milestones. The goals and objectives of DAMIS are to provide policy makers and managers at all levels with timely, accurate data on the extent, nature and trends of substance abuse in the Army; a centralized means for tracking an individual's current status or previous history through the ASAP from identification to final disposition; and information on the effectiveness of the ASAP. Although the TAIHOD hospitalization files contain information on some soldiers who are treated for alcohol abuse on an inpatient basis, the ACSAP files are more comprehensive. We are exploring ways to incorporate these data into our study. Towards that end, we are corresponding with Dr. McFarling about obtaining DAMIS data to link to the TAIHOD, and will seek approval from the ARIEM HURC to use these new data in the analyses for this project. In accordance with the terms of our grant, we will also, of course, apply to our Grants Officer for permission to revise our approved SOW objectives to use these data.

KEY RESEARCH ACCOMPLISHMENTS

- Formulated diagnostic criteria for both alcohol-related and injury-related hospitalizations to be examined in this study.
- Verified the continuity of diagnostic codes between the ICD-9 and the ICD-9-CM.
- Constructed a dataset of civilian alcohol-related hospitalizations and designed comparative analyses to explore prevalence rates of alcohol abuse in civilian versus Army populations. This will aid in the interpretation and generalization of our results to the community at large.
- Began preparation of a manuscript describing the epidemiology of alcohol-related hospitalizations among active-duty Army personnel.
- Developed a method to measure hospitalizations using episodes of care as opposed to counting each hospitalization as a discrete event. This will improve the accuracy of the frequency and prevalence estimates for alcohol-related and injury diagnoses within the Army.
- Began preparation of a manuscript discussing the need for an episode of care methodology specific to alcohol epidemiologic research and describing the method we have designed, using examples from this study.

REPORTABLE OUTCOMES

Manuscript: Alcohol abuse among U.S. Army soldiers, 1980-1999. *In preparation.* This paper will describe the basic epidemiology of hospitalizations for alcohol abuse. It will provide frequencies and rates of alcohol-related conditions at both the hospital and individual patient level, by year and by type of alcohol diagnosis. Demographic information will also be provided. Comparison of military to civilian populations will be made using data from the National Hospital Discharge Survey.

Manuscript: The use of episodes of care methods in epidemiology research (working title). *In preparation.* This paper will discuss the limitations of epidemiological estimates based upon hospitalizations or other health care encounters where transfers or continuation of care are not taken into account. A method of estimating episodes of care by evaluating the lag time between hospitalizations will be presented, and examples of method application will be provided using data from the present study.

CONCLUSIONS

Although we are still in the very early stages of this study, our preliminary work has revealed some important considerations regarding alcohol epidemiology research and interpretation of these studies. The modifications we have made in diagnostic inclusion criteria and in developing a methodology for identifying unique episodes of care should result in more complete and accurate ascertainment of cases and rates of alcohol abuse.

- Few published studies typically include patients who have ingested nonbeverage alcohols, or who are diagnosed with an adverse reaction to an alcohol deterrent. For example, recent studies have specifically excluded births, thus eliminating those cases associated with Fetal Alcohol Syndrome. Thus, rates of alcohol abuse based upon the criteria used in these studies may underestimate the problem due to incomplete case ascertainment. We are taking a more comprehensive approach to defining alcohol-related diagnoses and expect a more complete accounting of alcohol-related morbidity.
- While hospital admissions and discharges are commonly used to estimate the prevalence of alcohol abuse within a community, most studies do not or cannot take into account transfers for continuation of care, treating each hospitalization as a separate event. This can lead to an overestimate of the problem by inflating the total number of such hospitalizations. Transfer cases should be counted as a single episode of care. We have designed a methodology to address this issue.

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